

REMARKS

Status of the Claims

After entry of this amendment, claims 16-23, 31 and 53-65 are pending. Claims 16-23, 31 and 53-64 are rejected under 35 U.S.C §112, first paragraph as allegedly lacking adequate written description and enablement. Claims 16-23, 31 and 53-64 are rejected under 35 U.S.C §112, second paragraph, as allegedly indefinite. These objections are addressed below.

Claims 16, 21, 22, 31 and 55-64 have been amended. More particularly, claim 16 has been amended to recite “an isolated nucleic acid molecule encoding a polypeptide comprising...a vacuole targeting sequence; and... a biotin binding sequence”. Support for this amendment may be found in throughout the specification as filed (*see, e.g.*, at page 1, lines 6-7; and page 11, lines 3-5).

Claim 16 has also been amended to recite “or a functionally equivalent variant or fragment of the biotin binding sequence”. Claims 21 and 31 have been amended for correct antecedent basis to recite “the polypeptide encoded by the nucleic acid molecule” and “the polypeptide encoded by the nucleic acid molecule” respectively. Claim 22 has been amended for correct antecedent basis to recite “A method for producing...”. Claims 55-64 have been amended to recite “The nucleic acid molecule of...”. Support for this amendment may be found in the specification at, *e.g.*, page 16, lines 7-13. Claim 65, which recites particular biotin binding sequences has been added. Support for this amendment may be found in the specification at, *e.g.*, page 13, lines 25-30. This, no new matter is added by these amendments.

Rejections under 35 USC §112, first paragraph

1. Written Description

Claims 16-23, 31 and 53-64 are rejected under 35 U.S.C §112, first paragraph, as allegedly lacking adequate written description. In making the rejection, the Examiner

acknowledges that there is adequate written description for, *inter alia*, nucleic acids encoding the potato proteinase inhibitor I signal peptide operably linked to avidin mature peptide and potato proteinase inhibitor II signal peptide operably linked to streptavidin, but alleges that the specification contains inadequate written description for nucleic acids that encode a chimeric protein comprising *any* vacuole targeting sequence linked to *any* biotin-binding sequence or functional variants or fragments of the biotin binding sequence.

As set forth in MPEP §2173.02 “definiteness of claim language must be analysed in the light of (A) content of the application; (B) the teachings of the prior art; and (C) the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made”.

Applicants respectfully assert that, based on the specification and what is known to those of skill in the art, there is ample written description for the presently claimed nucleic acids encoding polypeptides comprising vacuole targeting sequences and biotin binding sequences. More particularly, Applicants submit that a skilled artisan could readily determine the structural features and physical properties of suitable vacuole targeting sequences and biotin binding sequences and functionally equivalent variants or fragments of the biotin binding sequences.

As set forth in the specification at page 11, line 24 to page 12, line 1, and as explained in Paragraphs 6-14 of the Declaration of Dr. John Christeller, one of skill in the art could readily identify and/or synthesize vacuole targeting sequences and biotin binding sequences suitable for use in the present invention. For example, the specification at page 11, lines 12-14 defines a vacuole targeting sequence as “a sequence operable to direct or sort a non-vacuolar plant protein to which such sequence is linked, to a plant vacuole,” thus providing ample support for the structural features and physical properties of such sequences. The Declaration of Dr. Christeller confirms that one of skill in the art would appreciate that a vacuole targeting sequence has such a physical property (*see*, Declaration at ¶ 7). The specification also explicitly states that suitable vacuole targeting sequences may be selected from those reported in the art including, for example, polypeptides targeting barley lectin, sweet potato sporamin,

tobacco chitinase, and bean phytohemagglutinin (*see, e.g.*, page 11, line 27 to page 11, line 34). The Declaration of Dr. Christeller confirms that there are many suitable vacuole targeting sequences known to those of skill in the art, or that could readily be identified by one of skill in the art on the basis of homology, putative cleavage sites, and from mature protein sequences (*see*, Declaration at ¶¶7-9, ¶¶ 12-14, and Appendix C).

In addition, the specification at page 13, lines 5-7 describes biotin binding proteins as “proteins which associate with biotin to form a complex with a dissociation constant of 10^{-6} M or less,” thus providing ample support for the structural features and physical properties of such proteins. The Declaration of Dr. Christeller confirms that there are many suitable biotin bind sequences known to those of skill in the art, or that could readily be identified by one of skill in the art on the basis of homology, putative cleavage sites, and from mature protein sequences (*see*, Declaration at ¶¶10-14, Appendix D, and Appendix E).

Thus, Applicants respectfully assert the specification does provide a skilled worker with sufficient information to identify the structural and physical characteristics of component nucleic acids suitable to construct the presently claimed chimeric nucleic acids, *i.e.*, nucleic acids that encode vacuole targeting sequences and nucleic acids that encode biotin-binding sequences or functional variants or fragments of the biotin-binding sequences.

In view of the foregoing remarks, Applicants assert that written description has been satisfied for the claims by the teachings of the specification as originally filed and respectfully request withdrawal of this aspect of the rejection under 35 U.S.C. § 112, first paragraph.

2. Enablement

Claims 16-23, 31 and 53-64 stand rejected under 35 U.S.C. §112, first paragraph, as allegedly lacking enablement. In making the rejection, the Examiner acknowledges that the claims are enabled for, *inter alia*, nucleic acids that encode a chimeric protein comprising *any* vacuole targeting sequences operably linked to avidin or streptavidin, cells and plants transformed with those nucleic acids, and methods for using the cells in plants to produce the

protein, but alleges that the specification does not enable nucleic acids that encode a chimeric protein comprising a vacuole targeting sequence operably linked to *any* biotin-binding sequence or functional variants or fragments thereof.

As set forth in MPEP §2164.01, a particular claim is enabled by the disclosure in an application if the disclosure, at the time of filing, contains sufficient information so as to enable one of skill in the art to make and use the claimed invention without undue experimentation. The fact that experimentation may be complex does not necessarily make it undue, if the art typically engages in such experimentation (*see, id.*). Furthermore, as set forth in MPEP § 2164.08, a rejection for undue breadth is inappropriate where “one of skill could readily determine any one of the claimed embodiments.”

Applicants respectfully assert the specification does in fact enable a person skilled in the art to make the nucleic acids of the invention commensurate in scope with the claims. The presently amended claims are directed to a nucleic acid encoding a polypeptide comprising a vacuole-targeting sequence and a plant-noxious pest control sequence (*i.e.*, a biotin binding sequence or a functional equivalent or variant of the biotin binding sequence).

Applicants submit that the specification provides ample guidance for one of skill in the art to practice the claimed invention. As explained in detail above, the specification defines biotin binding sequences or functional equivalent or variants of the biotin binding sequences as proteins which associate with biotin to form a complex with a dissociation constant of 10^{-6} M or less (*see, e.g.*, page 13, lines 5-7). In addition, the specification explicitly describes several biotin-binding sequences suitable for use in the presently claimed invention(*see, e.g.*, page 13, line 4 to page 14, line 19). The specification also provides multiple working examples which unequivocally demonstrate that nucleic acids encoding polypeptides comprising vacuole targeting sequences operably linked to biotin binding sequences can be constructed and that the resultant polypeptides are effective in pest control (*see, e.g.*, Examples 2-9 at page 27, line 1 to page 46, line 21).

The Declaration of Dr. Christeller confirms the teaching of the specification, explains how one of skill in the art would interpret “functionally equivalent variant or fragment

of the biotin binding sequence, and sets forth additional suitable biotin binding sequences for use in the presently claimed invention, (*see*, Declaration at ¶¶ 8-25 and Appendices C, D, and E). Dr. Christeller's Declaration explains that, based on the guidance of the specification and what is known in the art, one of skill in the art would appreciate that (1) a functionally equivalent variant of a biotin binding sequence is interpreted to exclude variants that result in a loss of biotin binding function (*see, e.g.*, Declaration at ¶ 17); (2) multiple biotin binding sequences and functionally equivalent variants and fragments thereof suitable for use in the presently claimed invention are well known to those of skill in the art (*see, e.g.*, Declaration at ¶18 and Appendices D and E); and (3) additional suitable biotin binding sequences and functionally equivalent variants and fragments thereof could be readily identified using methods known in the art (*see, e.g.*, Declaration at ¶11-12, 20-21 and Appendices D and E). Finally, Dr. Christeller's Declaration explains that based on the guidance in the specification and what is known in the art, one of skill in the art would appreciate that no undue experimentation is required to readily produce and test any plant transformed with the presently claimed nucleic acids (*see, e.g.*, Declaration at ¶¶22-25 and Appendix F).

In view of the foregoing remarks, Applicants assert that claims are fully enabled by the specification as originally filed and respectfully request withdrawal of this aspect of the rejection under 35 U.S.C. § 112, first paragraph.

Rejections under 35 USC §112, second paragraph

Claims 16, 21, 22, 31, 55-56 and 59 are rejected under 35 U.S.C. §112, second paragraph as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. The claims have been amended as discussed above to overcome these rejections and each will now be discussed in turn.

1. Claim 16

Claim 16 has been rejected as allegedly indefinite in terms of whether the claim recites a nucleic acid encoding a polypeptide that binds biotin or a nucleic acid that itself binds

biotin and similarly whether the vacuole targeting nucleic acid sequence itself targets vacuoles or encodes a protein that targets vacuoles. Claim 16 has been amended to recite: “An isolated nucleic acid molecule encoding a polypeptide comprising...”. Applicants submit that the claim now clearly recites a nucleic acid encoding a polypeptide wherein it is the polypeptide sequence that targets the vacuole and binds biotin. Accordingly, Applicants respectfully request withdrawal of this objection.

2. Claim 16

Claim 16 has been rejected as allegedly indefinite for recitation of “functionally equivalent variant” on the basis that it is unclear what function is equivalent and how the sequence of the variant differs from that of the biotin-binding sequence. Claim 16 has been amended to recite “or a functionally equivalent variant or fragment of the biotin-binding sequence”

Applicants submit it is now clear that it is the biotin-binding function that is “functionally equivalent”. Applicants also submit that the term “variant” is clear based on the definition at page 12, lines 3-8. Accordingly, Applicants respectfully request withdrawal of this rejection.

3. Claim 16

Claim 16 has been rejected as allegedly indefinite for its recitation of “fragment thereof” on the basis that it is unclear whether the fragment is of the variant or the biotin-binding sequence or if the fragment binds biotin. Applicants submit that following the amendment discussed above, it is clear the fragment is a fragment of the biotin-binding sequence that is also able to bind biotin. Accordingly, Applicants respectfully request withdrawal of this rejection.

4. Claim 21

Claim 21 has been rejected as allegedly lacking antecedent basis for the limitation “the polypeptide according to claim 16”. Accordingly, claim 21 has been amended to recite “the

polypeptide encoded by the nucleic acid according to claim 16". Accordingly, Applicants respectfully request withdrawal of this rejection.

5. Claim 22

Claim 22 has been rejected as allegedly lacking antecedent basis for the limitation "The method for producing a pest resistant plant". Accordingly, claim 22 has been amended to recite "A method for producing a pest resistant plant". Accordingly, Applicants respectfully request withdrawal of this rejection.

6. Claim 31

Claim 31 has been rejected as allegedly lacking antecedent basis for the limitation "the chimeric polypeptide according to claim 16". Accordingly, claim 31 has been amended to recite "the polypeptide encoded by the nucleic acid molecule according to claim 16". Accordingly, Applicants respectfully request withdrawal of this rejection.

7. Claims 55, 56 and 59

Claims 55, 56 and 59 have been rejected as allegedly indefinite for lacking antecedent basis for the limitation "The nucleic acid of claim 16". Accordingly, claims 55 to 64 have been amended to recite "The nucleic acid molecule...". Accordingly, Applicants respectfully request withdrawal of this rejection.

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Request for Continued Examination Under 37 C.F.R. §
1.114

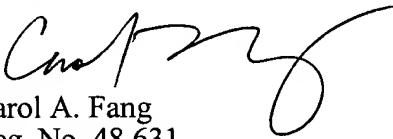
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CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, the Examiner is invited to telephone the undersigned at 415-576-0200.

Respectfully submitted,


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